

**THE
ASEA
HIGH-VOLTAGE
POWERAMA**

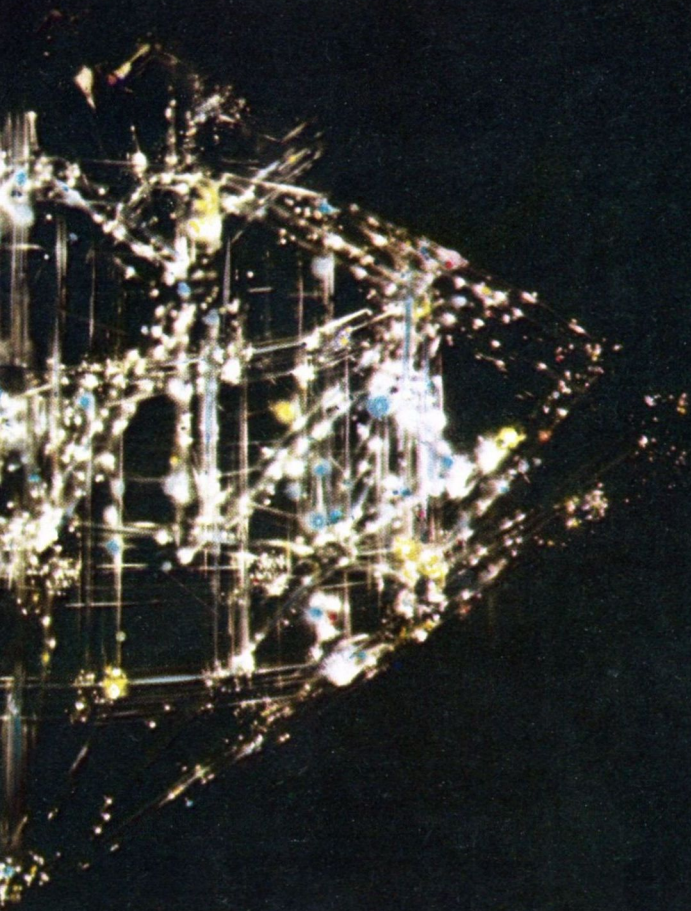


ASEA's **HIGH-VOLTAGE** **STAR GEN**

The ASEA (ah-say-ah) Star Generator provides a dramatic display of man's ability to control and utilize extremely high voltages to obtain power for our constantly growing electrical requirements.

The Star Generator consists of a cage of glass rods and copper balls. Within the cage is a larger copper globe with several antennas. As a high-voltage charge is gradually built up, star-like sparks mark contact of the antennas with the copper balls.

This electrified mobile was conceived by ASEA engineers whose normal responsibilities are the designing, production and testing of high-voltage equipment for power systems throughout the world.



NERATOR

The ASEA Powerama demonstrates the role of long-distance transmission in meeting our needs for more and more power. Specifically, the Powerama shows what is planned for one area of the United States—the West Coast—to effect the economical use of remote power resources and the efficient exchange of surplus power. The Pacific Intertie will be an outstanding achievement in power transmission. ASEA's pioneering efforts in this field will contribute to its realization.

The Powerama was designed and executed by John Meilink of AB Industriform in Sweden who is a design consultant to ASEA. The music was specially composed for the Powerama by Werner Wolf Glaser.

THE ASEA POWER

ALTERNATING CURRENT (AC)

AC systems—the power you have in your home—in which the current periodically changes magnitude and direction of flow, have distinct advantages in the generation, local distribution and consumption of electricity.

THREE-PHASE AC SYSTEMS

These systems are made up of three circuit branches carrying alternating current displaced in time. Three-phase generators and motors are, for general purposes, the most efficient form of electrical machine. Developed by Jonas Wenstrom, the scientific father of ASEA, and other scientists, the three-phase system is used almost exclusively today for producing electric power and delivering it to the large consumer.

WATER POWER

Water is one of our main sources of energy. Water resources more and more remote from the power consumer are being developed today to meet steadily growing demands for electricity. ASEA, based in river-blessed Sweden, has consistently led in the manufacture of larger, more efficient hydro-electric generators.

TRANSMISSION

High-voltage power lines transport electricity from generating stations to points of consumption; also connect adjacent utility networks to allow exchange of power during periods of varying demand. Higher voltages permit use of lower current to transport the same amount of power, affording economies in construction and operation of the lines.

EXTRA HIGH VOLTAGE (EHV)

EHV, which normally refers to ratings of 230,000 volts and higher, is now used for economical and efficient transmission of larger quantities of power over longer distances. In 1952, ASEA equipped the world's first 400,000-volt system. ASEA is now delivering equipment for a 735,000-volt system in Canada, another EHV record. The power-carrying capacity of this single overhead line is equal to that of 50 lines operating at 130,000 volts—an indication of the economy as well as the natural scenery preservation features of EHV.

EHV transmission is helping reduce the cost of urban power. Utility companies have found they can purchase and transport hydro-electric power over distances of 1000 miles or more at lower costs than would be possible with city-based modern power plants.

DIRECT CURRENT (DC)

With DC, current flows continuously in one direction. DC is ideal for power transmission since certain stability and control problems in AC lines of extreme length do not appear in DC systems; DC also reduces power losses and line costs.

AC-DC CONVERTERS

To derive the benefits of DC transmission, a convenient method was needed to convert generated AC into high-voltage DC for transmission and then change the HVDC back into AC for local distribution and consumption. The invention by ASEA of its high-voltage ionic valve and the concurrent development by the company of its DC system technology provided the solution.

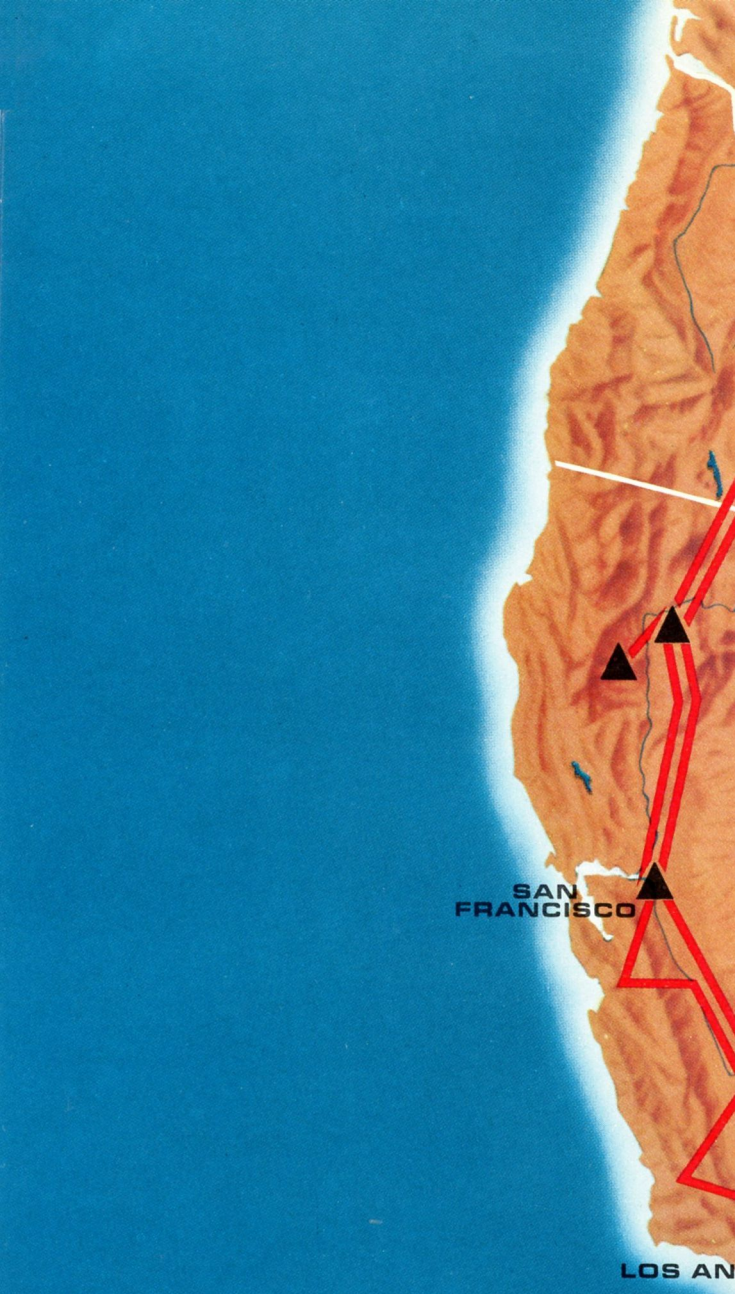
HVDC TRANSMISSION

High-voltage direct current represents the latest concept in high-voltage power technology. At distances of 450-600 miles or greater, HVDC transmission via overhead lines is usually more economical than AC systems. For such distances, the one-third saving with DC lines generally outweighs the cost of the conversion equipment. Various technical factors, however, can make HVDC preferable for shorter lines also.

Two HVDC systems have been in operation in Europe for several years; four others will be commissioned in 1965. All six are based on ASEA technology and equipment.

EXCHANGE OF POWER

Power networks with different patterns of energy consumption benefit from transmission interties. England and France reach their highest consumption levels at different times in the day. An ASEA-equipped HVDC link across the English Channel connects the two countries' power grids, enabling each to obtain "peak-load" requirements from the other. Sweden's abundant water resources will commence this year to supplement steam-generated power of Denmark and West Germany via an ASEA HVDC link; in dry seasons, the power flow will be reversed. The substantial savings in equipment requirements effected by such interconnections also apply to the Pacific Intertie. Summertime surplus power from the Northwest will help meet Southwest peak loads for air conditioning and irrigation; wintertime surplus from the Southwest will meet Northwest peak loads for heating.



A map of the western United States, specifically the Pacific Northwest and California, showing the Pacific Intertie project. The map features a blue background for the ocean and an orange-brown textured background for the land. A network of red lines represents AC transmission lines, and a green line represents a DC transmission line. Black triangles indicate the locations of power stations. The city of San Francisco is labeled, and the city of Los Angeles is partially visible at the bottom right. A white line runs diagonally across the top right of the map.

SAN
FRANCISCO

LOS AN

THE PACIFIC INTERTIE - FREEWAYS OF POWER FOR ELEVEN STATES

AC TRANSMISSION LINES 

DC TRANSMISSION LINES 

POWER STATION 

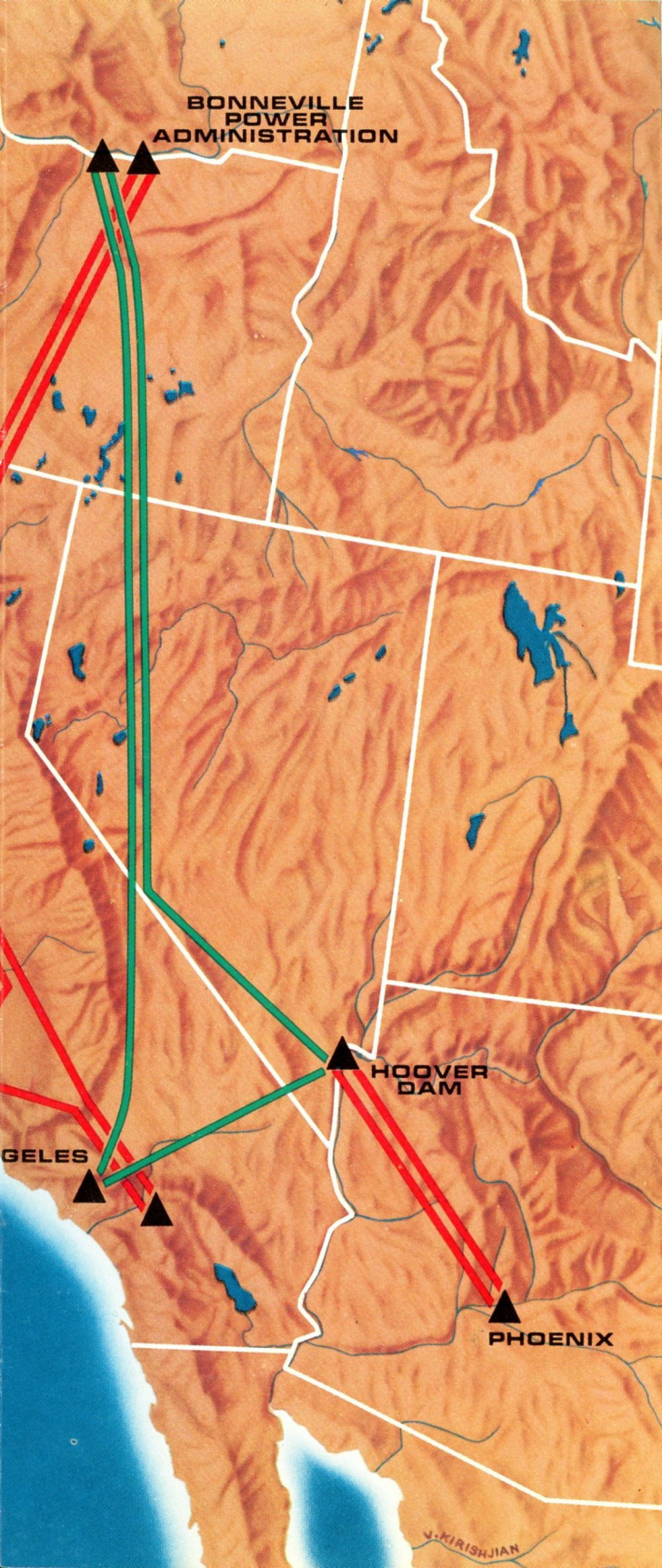
**BONNEVILLE
POWER
ADMINISTRATION**

**HOOVER
DAM**

GELES

PHOENIX

J. KIRISHJIAN



◀ The Pacific Intertie is the largest single electrical transmission program ever undertaken in the United States. As shown on the adjacent map, the Intertie will link the Bonneville Power Administration's huge hydro-electric power resources on the Columbia River in Oregon with Los Angeles, San Francisco, the Hoover Dam and Phoenix. Financed by public and private utilities and the Federal Government, the Intertie's \$700 million cost will produce benefits for 11 Western states of close to \$3 billion over a fifty-year period.

The Intertie's four main transmission lines will carry upwards of 5,000,000 kilowatts of electricity, either southward or northward. Two of the lines will transmit high-voltage alternating current (HVAC), heretofore the only type utilized for

ASEA ACHIEVEMENTS

ASEA's world-wide reputation for advanced electrical technology spans eighty years. ASEA achievements have resulted in more economical, more efficient apparatus and controls for the following:

POWER

ASEA power equipment is used throughout the world. In addition to its EHV and HVDC achievements, the company has produced record-size water-power generators, power transformers and gas turbines. Recent ASEA milestones include:

- 1952—World's first 400,000-volt transmission network.
- 1954—World's first commercial HVDC transmission, linking Swedish mainland with island of Gotland.
- 1961—English and French power systems linked via HVDC cable system employing ASEA converters.
- 1963—ASEA becomes largest foreign supplier to Canada's 735,000-volt transmission line—world's largest, most powerful.
- 1964—Receives order for Western World's largest waterwheel generator—225,000 kva.
- 1965—ASEA equipment ordered for North America's first HVDC system, linking Vancouver Island and the Canadian mainland.
- 1965—HVDC systems equipped by ASEA commissioned in New Zealand, Italy, Japan and Scandinavia.
- 1965—ASEA and General Electric Company

transmission in this country; the other two lines will carry high-voltage direct current (HVDC), marking not only the introduction of DC transmission in the United States but also the world's longest, most powerful transmission lines—825-mile freeways of power.

ASEA is proud that the HVDC technology it developed has also been selected for the Pacific Intertie and is pleased to join in this project with General Electric Company, its U. S. licensee in this field, in advancing America to world leadership in power transmission. General Electric's vast resources and technical capability coupled with ASEA's experience and achievements in the field of HVDC form a logical combination to help bring the Pacific Intertie into reality.

named co-managers for construction of first HVDC line in the United States—the initial phase of the Pacific Intertie.

INDUSTRY

ASEA equipment for the electrification and control of processes has wide application in many vital industries. Besides its top-quality motors, industrial drives and controls, ASEA serves world industry with:

- Large arc and induction industrial furnaces.
- Induction stirrers for improved metal production.
- Pressductors for accurate measurement, weighing and control.
- Thyristors—silicon-controlled rectifiers for industrial drives.
- Synthetic diamonds for industrial applications.

TRANSPORT AND TRACTION

ASEA has furnished virtually all equipment for Sweden's railway network, one of the world's largest electrified systems, and is a major supplier to railway systems on the European Continent. In addition to locomotives, urban transit trains and railway power and control equipment, the ASEA Group produces:

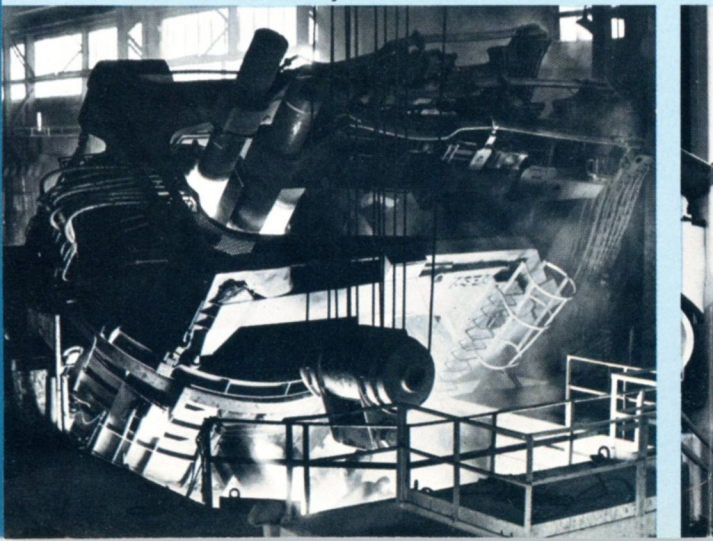
- Multi-rope friction-drive mine hoists of record size.
- Overhead cranes.
- Elevators and escalators.
- Deck machinery for ships.
- Marine propulsion and auxiliary electrical equipment.



ASEA hydro-electric generators are performing yeoman service in countries possessing significant amounts of water power. All 22 with a total output of 2¼ million kva ordered to date for Australia's Snowy Mountain project will be ASEA machines.

ASEA TECHNOLOGY

ASEA is a major supplier of arc and induction furnaces, rolling-mill drives and pressdrives for automation in the steel industry.





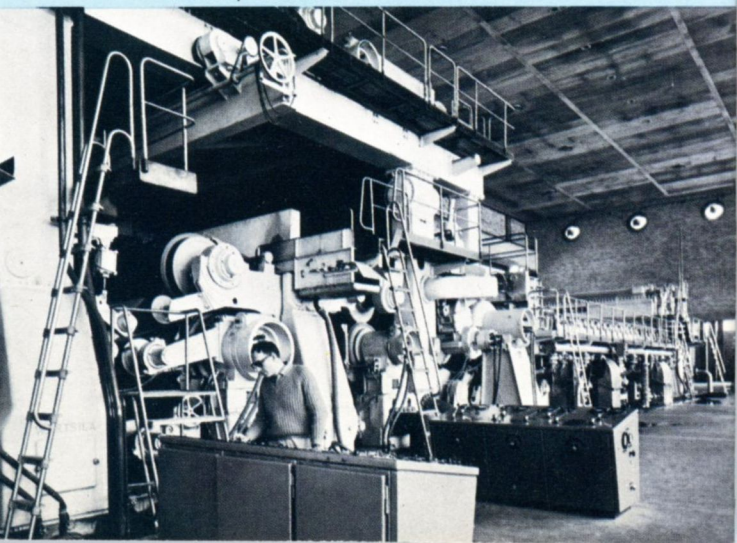
in all
2 units
ralia's



ASEA is one of the world's leading exporters of power transformers, which are rated as high as 735,000 volts and have a three-phase output up to 1 million kva.

LOGY AT WORK

Drives and control equipment for the pulp, paper and printing industries are ASEA specialties.



ASEA TODAY

The ASEA Group is a large international industrial complex with over 100 subsidiaries in Sweden and throughout the world. The parent company ASEA is one of the world's largest manufacturers of electrical equipment with factories in Europe, North America, South America, Australia and Africa. Activities of the Group's subsidiaries cover a wide range of industries from the production of steel to lighting equipment and glass fiber products. With sales outlets in 70 countries, ASEA's role in world markets is based principally on its engineering skills in design and production of highly efficient and dependable equipment. This policy has resulted in continued sales growth, reaching a record \$405 million in 1964.

ASEA IN THE FUTURE

Research and Development remain the foundation for ASEA's progress. The improvement of existing products and the development of entirely new types of equipment to serve the world's industries are a constant challenge always accepted. Among the more exciting developmental activities now in progress at ASEA are:

- Fuel cell propulsion for submarines.
- Space satellites.
- High-pressure isostatic metal-forming.
- Cryogenics to study superconductivity at very low temperatures.
- Automation of ships and trains.
- Control systems for hydrofoil seacraft.

Through intensive studies in new scientific areas . . . through broad development activities with new materials and new engineering techniques, ASEA is helping to build the world of tomorrow and to assure the continued extension of

**ASEA Power Technology at
Work Throughout the World**

ASEA

Allmanna Svenska Elektriska Aktiebolaget

World Headquarters—Vasteras, Sweden

In U. S.—ASEA Electric, Inc.—Armonk, N. Y., Chicago, San Francisco

In Canada—Canadian ASEA Ltd.—Toronto, Montreal, Vancouver

And subsidiaries and representatives in 70 other countries

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DC TRANSMISSION LINES 
POWER STATION 

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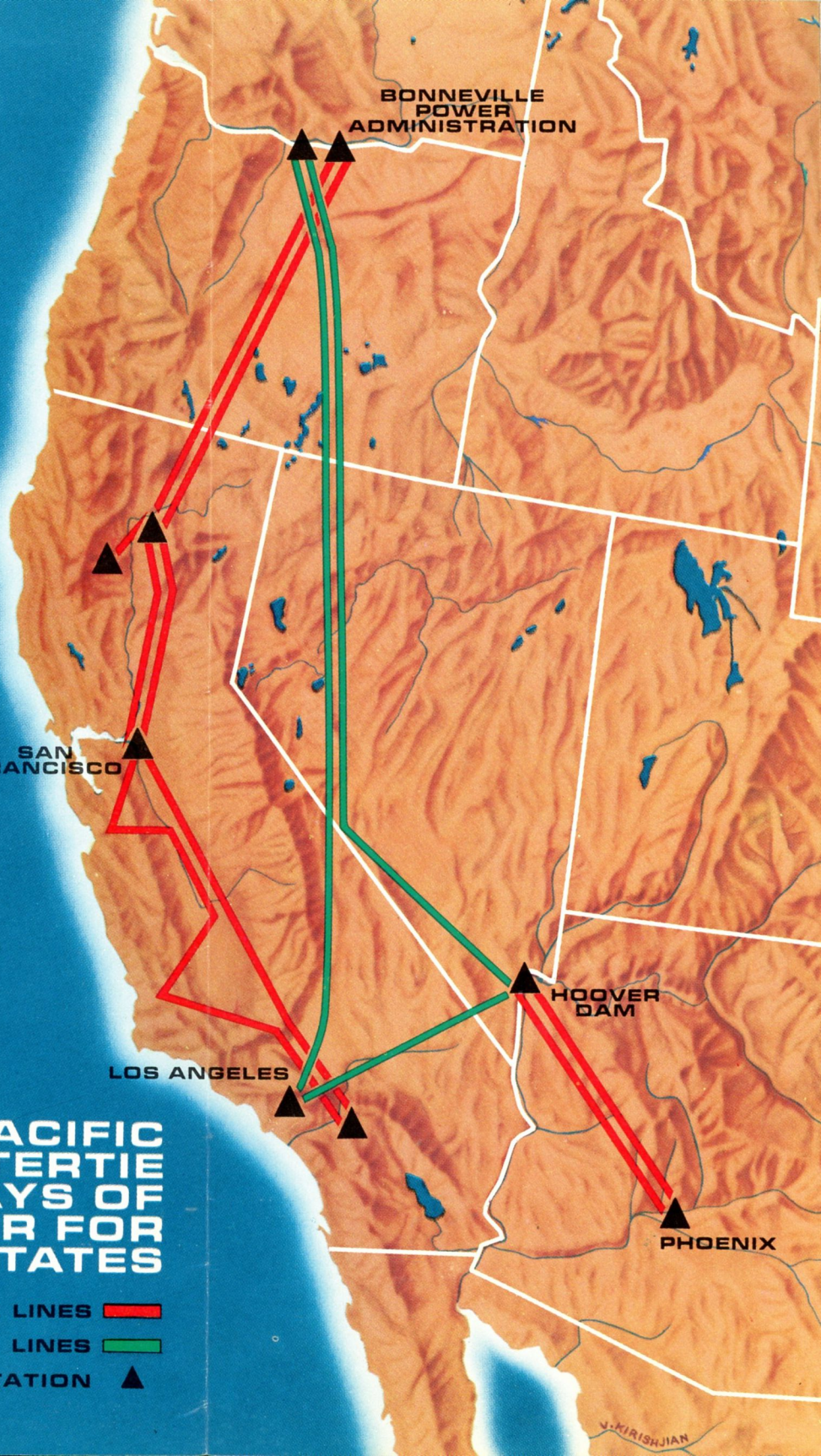
LOS ANGELES

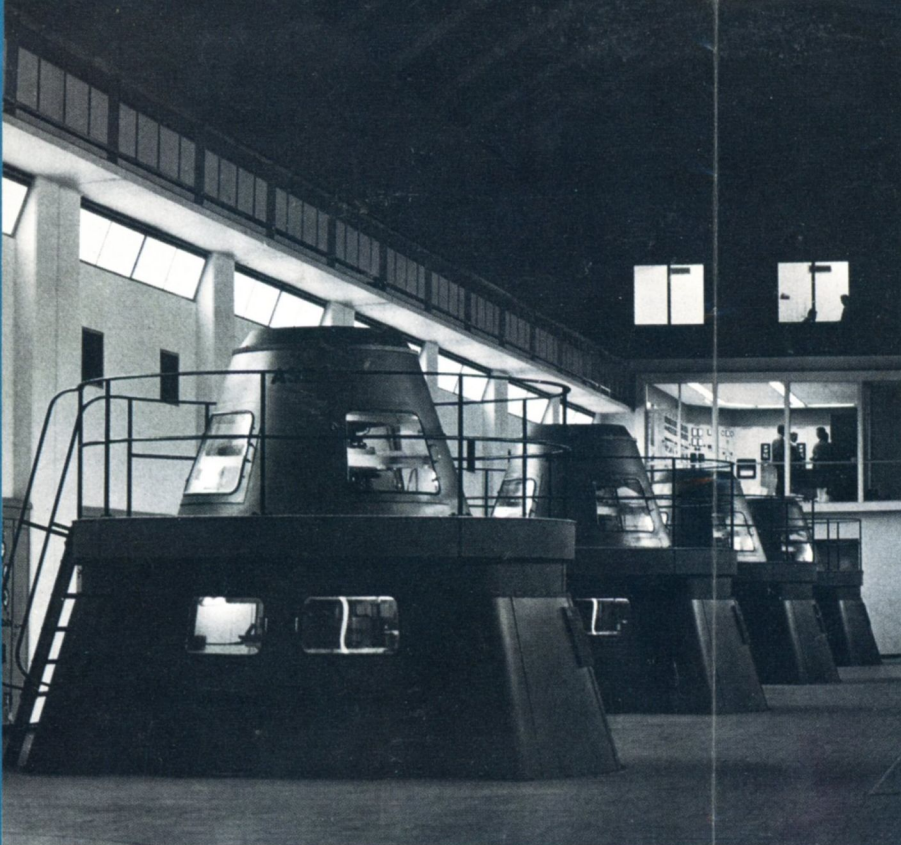
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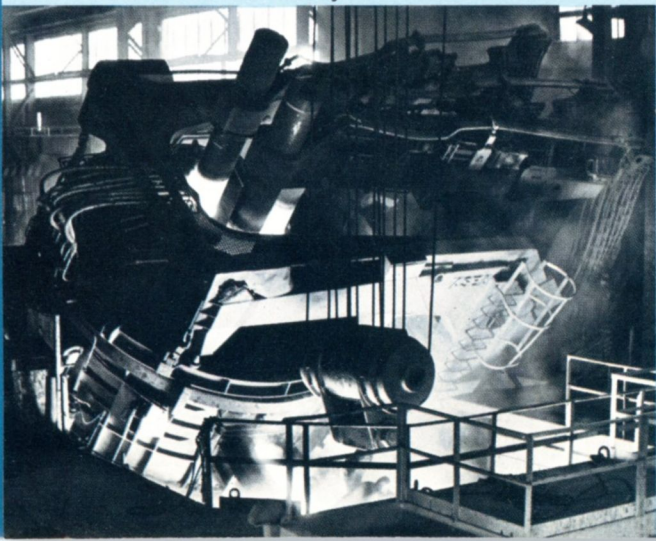
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